

2nd NIST Workshop on Cement Materials Characterization

July 12–14, 2017

Lecture Room A, Administration Building
NIST, Gaithersburg, Maryland

Instructors

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General Description

This workshop will provide practical information, guidance, and practice for performing chemical and structural analysis of portland cement and portland cement clinker materials. Lectures and practicums will cover quantitative X-ray powder diffraction, quantitative scanning electron microscopy and microanalysis. Additional sessions will give information on measuring aqueous solution composition in cement binders and the reaction rates with water at solid surfaces.

This workshop requires the prior downloading and installation of several open-source software applications onto the participant's Windows or Mac OS X laptop computer. Instructions for preparing the laptop are provided in a separate document.

Workshop Schedule

Wednesday, July 12, 2017

8:30	Welcome and Orientation	H. Harary
8:40	Lecture 1 <i>Materials characterization history through ASTM C 1365</i>	P. Stutzman
9:00	Lecture 2 <i>X-rays, powder diffraction, and Rietveld analysis with applications to cementitious materials</i>	S. Feldman
10:30	Break	
10:45	Lecture 3 <i>Specimen preparation and phase identification</i>	P. Stutzman
11:15	Practicum 1 <i>Single phase and simple mixture identification</i>	All
12:00	Lunch at NIST Cafeteria	
12:45	Lecture 4 <i>Introduction to Profex-BGMN software</i>	P. Stutzman
1:45	Practicum 2 <i>Analysis of single phases and simple mixtures</i>	All
2:30	Break	
2:45	Lecture 5 <i>Analysis of clinker and cements using selective extractions</i>	P. Stutzman
3:15	Practicum 3 <i>XRD analysis of SRM 2686a clinker</i>	All

Thursday, July 13, 2017

8:30	Lecture 6 <i>Recap of clinker analysis practicum</i>	P. Stutzman
9:00	Practicum 4 <i>Cement analysis exercises</i>	All
10:30	Break	

Thursday, July 13, 2017 (Continued)

10:45	Lecture 7 <i>X-ray fluorescence spectrometry I: sample preparation</i>	D. Broton
11:45	Lunch at NIST Cafeteria	
12:30	Lecture 8 <i>X-ray fluorescence spectrometry II: calibration, analysis, and examples</i>	D. Broton
1:30	Break	
1:45	Lecture 9 <i>Quantitative methods in scanning electron microscopy</i>	P. Stutzman, A. Brand
3:15	Break	
3:30	Practicum 5 <i>SEM analysis of SRM 2688 clinker</i>	All

Friday, July 14, 2017

8:30	Lecture 10 <i>Analyzing cement microstructure with MicroChar</i>	J. Bullard
9:00	Practicum 6 <i>SEM analysis of cement</i>	All
10:15	Break	
10:30	Lecture 11 <i>Measuring reactions at solid surfaces</i>	A. Brand
11:15	Lecture 12 <i>ICP-OES for measuring solution composition</i>	L. Perry
11:45	Lunch at NIST Cafeteria	
1:00	Practicum 7 <i>Elective sample analysis, XRD or SEM, and optional lab tour</i>	All